

# Desk printer DP 24-40 User's Manual



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## GENERAL INFORMATION REGARDING SAFETY

- Read and keep the following instructions.
- Observe all warnings and follow all instructions attached to the printer.
- Before cleaning the printer, disconnect the feed cable.
- Clean the printer with a damp cloth. Do not use liquid or spray products.
- Do not operate the printer near to water.
- Do not place the printer on unsteady surfaces. It could fall and get seriously damaged.
- Do not place the printer on soft surfaces or in poorly ventilated environments.
- Position the printer in such a way as to ensure that the cables connected to it will not be damaged.
- Use the type of electricity supply marked on the printer label. In the event of uncertainty, contact the seller.
- Do not obstruct the vents.
- Do not put objects of any kind inside the printer as they could cause a short circuit or damage parts which could affect its performance.
- Do not spill liquids on the printer.
- Do not carry out technical operations on the printer with the exception of the scheduled maintenance operations specifically indicated in the user's manual.
- Disconnect the printer from the electricity supply and have it repaired by a specialized technician should any of the following conditions occur:
  - A. The feed connector has been damaged;
  - B. Liquid has penetrated to the inside of the printer;
  - C. The printer has been exposed to rain or water;
  - D. The printer is not operating normally despite the instructions in the user's manual having been followed;
  - E. The printer has been dropped and its case damaged;
  - F. The performance of the printer is poor;
  - G. The printer does not work.

## INTRODUCTION

The DP24-40 is an extremely simple and functional desk printer. It is the ideal solution for applications which require the immediate printing of data on a ticket, whether they be of an industrial, professional or laboratory nature. It is suitable for POS, weighing system, receipts (not for tax purposes) as well as for security, controlling and diagnostics purposes.

It has an 8-needle, rapid impact printing mechanism which uses 57,5 mm wide ordinary paper rolls and can be equipped with a cutter (DP24-40 A) with complete or partial cut facility.

A special feature of the DP24-40 printer is the fact that it is extremely light-weight and has an internal power supply. It can be personally programmed and is thus able to meet all possible requirements.

It has a 150-byte print buffer and, as an option, can be equipped with a 2Kbyte EEPROM.

Its standard interfaces are RS232 serial and CENTRONICS parallel. It can, in addition, be equipped with a Real Time Clock. It comes in three colours and two models, with 24 and 40 columns.

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### 1.1. Removing the printer from its package

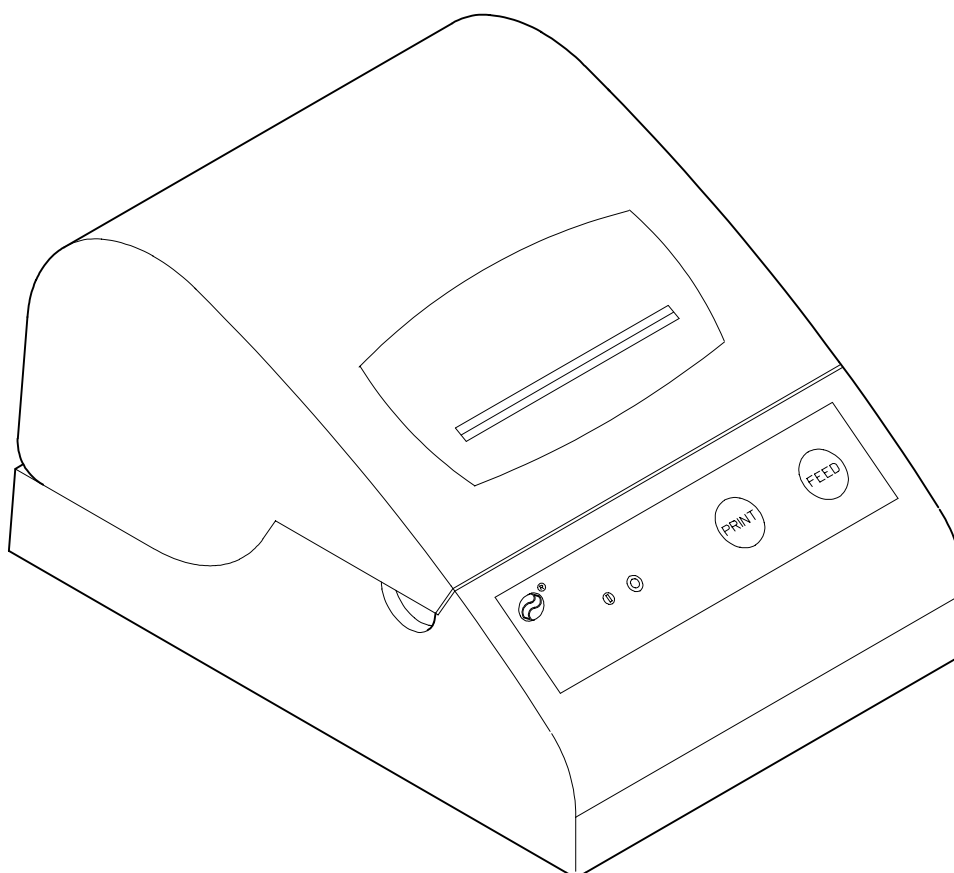
Open the package and check that:

- a) none of the parts have been damaged during transportation;
- b) that the ink cartridge is fitted on the printing mechanism and the paper roll is in place;
- c) that the supply cable is in the package.

### 1.2. Precautions

- a) Do not print when there is no paper and/or ribbon: this leads to rapid deterioration of the needles.
- b) Do not put objects inside the printer.
- c) Do not pull the printer carriage manually when the printer is ON.
- d) Before connecting the printer to the mains, check that the power supply or system ON/OFF switch is in the OFF position.
- e) Avoid blows to any part of the printer, both during and after installation.

Figure 1



## 1.3. Product description

The DP 24 - 40 printer (fig. 1) has an ABS casing with a top covering the paper roll and print head. The dimensions of the printer are shown in appendix A. The keyboard, located on the front of the printer, consists of the PRINT and FEED keys and a LED (POWER ON).

Figure 2



### PRINT key

When this key is pressed when the printer is in serial, it transmits control character "\$0D". If the printer has a 2 Kbyte EEPROM (option, see paragraph 2.4), the contents of the memorized blocks are transmitted.

### FEED key

This enables the manual paper feed. If pressed briefly, when the RTCK option is installed, the time and date are printed.

The RS232 interface connection (see appendix B), ON/OFF switch and supply cable are on the back of the printer.



## 2.1. Installation procedure

1. Position the printer on a smooth, level surface, ensuring that there is enough space for changing paper and ink cartridge.  
Check that it is near an electrical socket with normal voltage (the power supply cable is 1.5 m long).
2. insert the interface connection securing it with the screws provided on the connector itself and connect the power supply plug to the mains.
3. insert the supply plug to the mains and turn on the printer.

## 2.2. Connections

### Logic

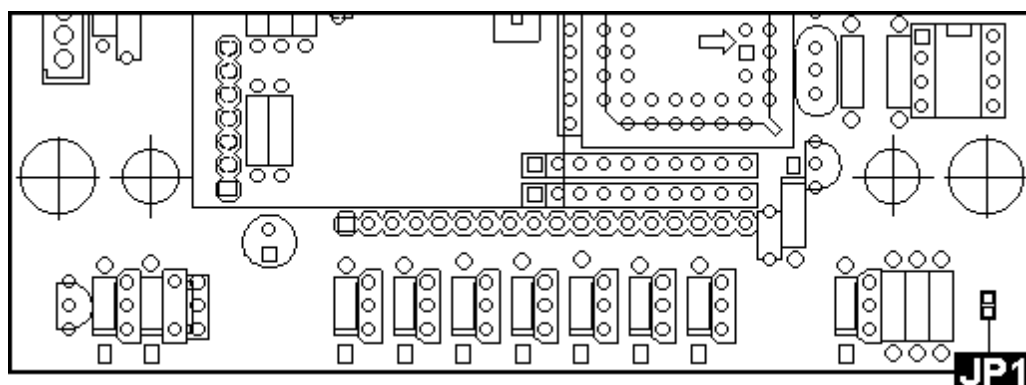
The DP 24 - 40 has an RS232 serial interface (9-pin rectangular connector) or, optionally, a CENTRONICS parallel interface (25-pin rectangular connector).

For the arrangement of the signals on the connector pins, and for connection with Personal Computer (cable) see appendix C.

### Power supply

The DP 24 - 40 printer has a 1.5 m long power supply cable with a standard plug. Check that the mains voltage is compatible with the technical characteristics of the machine (see appendix A.1).

Figure 3



## **2.3. Configuration**

The printer's default parameters are configured , for software release 5.3, by means of either the keyboard or personal computer. The parameters affected by configuration are:

- **enabling of Real Time Clock setting;**
- **printing modes;**
- **no. of bits in parallel communication;**
- **enabling of seconds display;**
- **CRLF mode;**
- **enabling of printing of block 1;**
- **character sets;**
- **enabling of lapsed time meter.**

The settings made are saved on the 256-byte EEPROM. As an option, a 2 Kbyte EEPROM (non volatile memory) containing 3 blocks - one of 300 bytes and two of 700 bytes - is available, in which information of any kind can be stored.

### **Configuration through PC**

This can be done by using an IBM or IBM-compatible computer with a serial output, or else by using a programme which can be supplied on request. This programme, with its pull-down menus is user-friendly and prompts the operator at each stage of the input procedure. For the Centronics parallel version, the printer must be connected to the PC with the serial connector J5 (internal) and an adaptor which is available on request.

### **Configuration using PRINT and FEED keys**

If, when the printer is switched on, both keys are held down simultaneously, the printer enters configuration mode and prints the first modifiable parameter. Each time the PRINT key is pressed subsequent to this, the variation of the parameter is shown and the its current value is printed. After entering the desired parameter, press the FEED key to go on to the next parameter, and so on. Once all the parameters have been entered, the printer prints a message to indicate that setting procedure has been completed. The configuration of the printer through the keyboard may be disabled by bonding JP1 on the front part of the interface card (figure 3). In order to gain access to this, loosen the 4 self- threading screws on the base of the printer.

## 2.4. Self-test

To enable the self-test, hold down the FEED key (paragraph 1.3) while switching on the printer. The self-test consists of the printing of the printer's currently set data, a memory check and the printing of the entire set of ASCII characters.

Figure 4

```
* AUTOTEST *  
MOD. DP245 ** - 24  
  
ROM OK  
ROM RELEASE 5.3  
EEPROM 16 DETECTED  
SERIAL NUMBER = 00000897  
TEST DATE = 28/01/98  
*  
SET UP DEFAULT :  
PRINT = NORMAL  
LITTLE  
FONT 1 SELECTED  
CR-LF HONOR CR  
BAUD RATE = 1200  
STOP BIT = 1  
PARITY = NONE  
BITS PER CHR. = 8  
CONTROL XON-XOFF  
TEXT = DISABLE  
*  
EXTERNAL DEVICE :  
NONE  
*  
SERIAL PORT SELECTED  
*
```

## 2.5. Maintenance

### Changing the paper roll

To change the paper roll, proceed as follows:

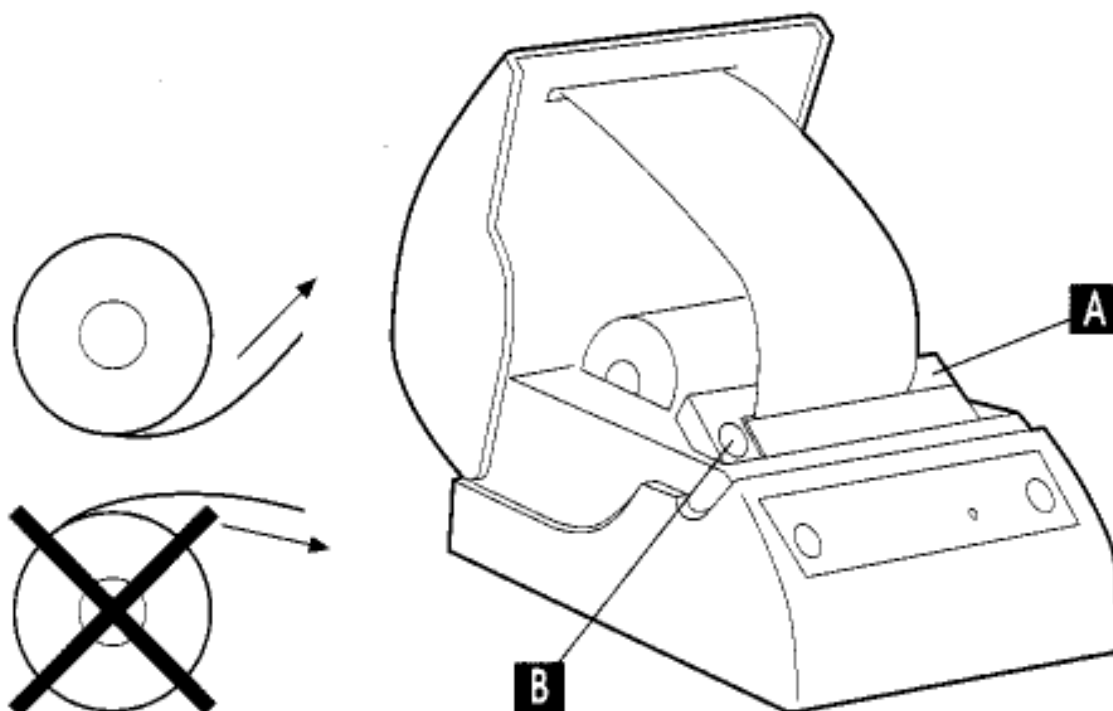
1. open the top of the printer and place the paper roll in position, following the arrow, as indicated in figure 5;
2. insert the end of the roll in the slit (A) of the print mechanism;
3. press the FEED key (B) so that a few centimetres of paper come out of the printer;
4. insert the end into the slit on the top of the printer and close it.

### Changing the ribbon

To change the ribbon, proceed as follows:

1. open the top of the printer and remove the old ribbon cartridge, by pressing down at point "A", as shown in figure 5;
2. insert the new ribbon, making sure that it is correctly positioned;
3. pull the ribbon tight by turning the knurled knob "B" and close the top down again.

**Figure 5**



## 3.1. Printing modes

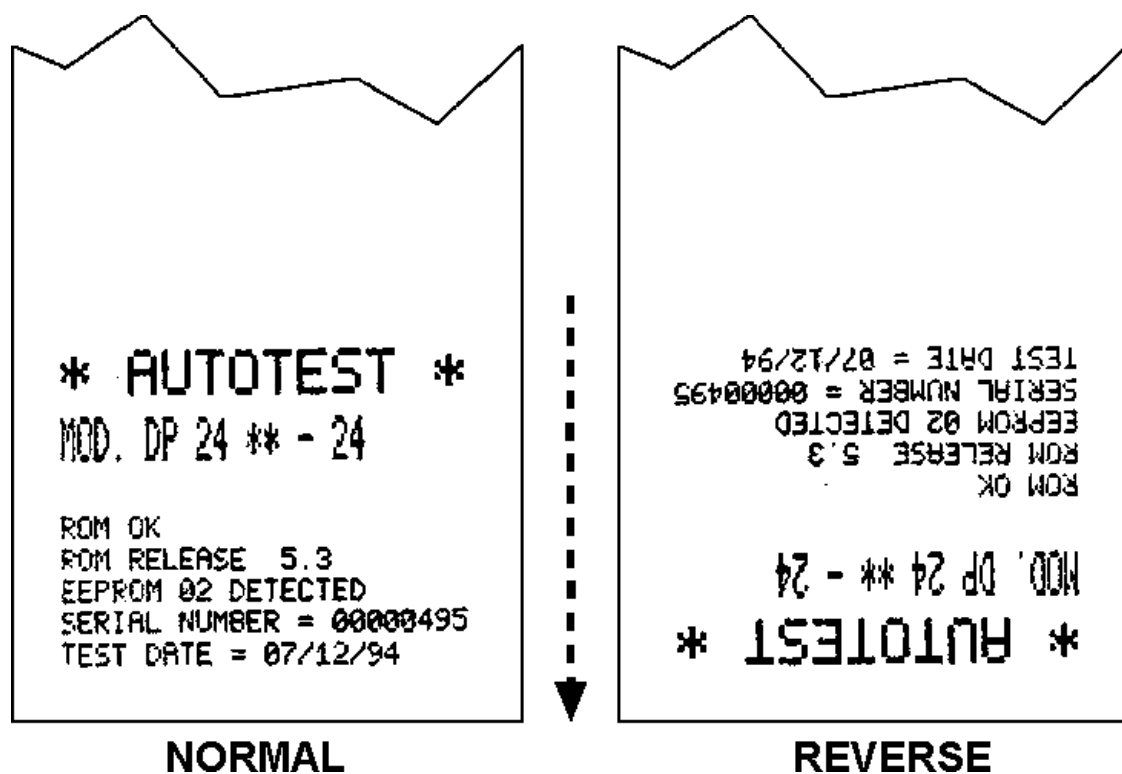
The DP 24 - 40 printer has two printing modes which can be selected by means of control characters: NORMAL and REVERSE (figure 6).

The basic character matrix is 6 x 10 points. Characters may be printed in various formats.

The table 2 (appendix A) shows the size of the characters for the respective formats, depending on whether the printer is the 24 or 40 column model.

For further details on the selection of printing modes, please refer to the paragraph covering control characters (paragraph 3.3).

Figure 6



## 3.2. Graphics

The size of the graphic point and the number of points per line vary depending on the number of columns, (see table appendix A).

To obtain a graphic printout, enter the command \$11 at the beginning of each line.

The graphic configuration byte format is as follows:

<b>X</b>	<b>R</b>	<b>P6</b>	<b>P5</b>	<b>P4</b>	<b>P3</b>	<b>P2</b>	<b>P1</b>
D7	D6	D5	D4	D3	D2	D1	D0

where:

**X** is not utilized;

**R** must be set at 1;

**P1, ..., P6** are the data of the graphic points (1 prints, 0 does not print)

The P6 bit of the string of points transmitted is printed on the left and the others (P5, P4, P3, P2, P1) follow from left to right, as shown:

<b>1st byte</b>		<b>2nd byte</b>		<b>3rd byte</b>
P6 P5 P4 P3 P2 P1		P6 P5 P4 P3 P2 P1		P6 P5 P4 P3 P2 P1

To print a line of points transmit:

**\$11, N x \$7F** (where N is the number of characters per line), **\$OD**.

To print an empty line, transmit:

**\$11, \$40, \$OD**.

## 3.3. Control characters

Table 1, lists all the commands for function management of the DP 24-40 printer. These commands can be transmitted to the printer with either the serial or parallel interface; if, however, the parallel interface is used, the user will not be able to receive the data required, since this interface is unidirectional.

The commands can be transmitted to the printer at any moment, but they will only be carried out when the characters previously transmitted have been printed or the commands previously transmitted have been carried out. There are no commands with priority status; all the commands are carried out when the circular buffer is free to do so. They can be one-, two- or three-byte commands.

The table describes each control character in detail (the table lists the page on which the command is described).

Table 1

Com. ASCII	Com. HEX	Description
-	\$00 <sup>(1)</sup>	Printing in small characters
-	\$01 <sup>(1)</sup>	Printing in double width
-	\$02 <sup>(1)</sup>	Printing in double height
-	\$03 <sup>(1)</sup>	Expanded printing
-	\$04 <sup>(1)</sup>	Restores small characters printing
-	\$0A	Forward feeds one line
-	(n) \$0B <sup>(1)</sup>	Forward feeds (n) lines
-	\$0D	Prints line buffer
-	\$0F	Sets CRLF mode
-	\$11	Graphic mode
-	\$12	Prints time and date
-	\$13	Sets time and date in serial
-	\$14	Transmits time and date in serial
-	\$17 <sup>(2)</sup>	Prints 1 <sup>st</sup> programmable character
-	\$18 <sup>(2)</sup>	Prints 2 <sup>nd</sup> programmable character
-	\$19 <sup>(2)</sup>	Prints 3 <sup>rd</sup> programmable character
-	\$1A <sup>(2)</sup>	Prints 4 <sup>th</sup> programmable character
-	\$1C <sup>(2)</sup>	Prints 5 <sup>th</sup> programmable character
-	\$1D <sup>(2)</sup>	Prints 6 <sup>th</sup> programmable character
-	\$1E <sup>(2)(3)</sup>	Prints 7 <sup>th</sup> programmable character
-	\$1F <sup>(2)(3)</sup>	Prints 8 <sup>th</sup> programmable character
ESC R	\$1B \$52	Sets REVERSE mode printing
ESC N	\$1B \$4E	Sets NORMAL mode printing
ESC @	\$1B \$40	Resets printer
ESC C	\$1B \$43	Makes complete cut
ESC P	\$1B \$50	Makes partial cut
ESC D	\$1B \$44	Enters date in print buffer
ESC T	\$1B \$54	Enters time in print buffer
ESC U	\$1B \$55	Enters date (mm:dd:yy) in print buffer
ESC S	\$1B \$53	Enables printing of second
ESC O	\$1B \$4F	Transmits operating hours in serial
ESC H	\$1B \$48	Zero-sets total operating hours
ESC o	\$1B \$6F	Prints total operating hours
ESC B	\$1B \$42	Sets character font 1
ESC b	\$1B \$62	Sets character font 2
(aa) ESC r	(aa)\$1B \$72	Reads a piece of data at an address
(aadd)ESC w	(aadd)\$1B \$77	Writes a piece of data (dd) in an address (dd)
(dd) ESC G	(dd) \$1B \$47	Writes value (dd) in option register
(dd) ESC M	(dd) \$1B \$4D	Writes value (dd) in printing mode
ESC p	\$1B \$70	Transmits option register in serial
ESC m	\$1B \$6D	Transmits print mode in serial

<b>ESC s</b>	\$1B \$73	Transmits next character in serial
<b>ESC W (n)</b>	\$1B \$57 (n)	Starts saving block (n)
<b>ESC V (n)</b>	\$1B \$56 (n)	Prints block (n)
<b>ESC E (n)</b>	\$1B \$45 (n)	Transmits block (n) in serial
<b>ESC Z</b>	\$1B \$5A	Block saving completed
<b>ESC J (n)</b>	\$1B \$4A (n)	Loads programmable character (n)

## Notes to table 1 :

- (1) This command clears the line buffer and for this reason, it must not sent after an ASCII string not ended with CR or LF character, therefore this string will be deleted.
- (2) Only release software 5.3
- (3) For software release 4.3 respectively 1<sup>st</sup> and 2<sup>nd</sup> programmable character.

## ASCII: - Hex: \$00

### Printing in small characters

The command \$00 is used for reverting to printing in small characters. If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code \$00. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string, otherwise the string will be erased. It is better, therefore, to transmit the command after a (CR) \$0D so that the string is printed first and, on clearing the buffer, small character printing is restored. In many user applications the character \$00 is transmitted as a piece of calculation data or as a numerical value, automatically erasing the string preceding it. A small character is 6 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code \$17 to code \$1F.

## ASCII: - Hex: \$01

### Double width printing

The command \$01 is used to activate double width printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command \$01 after a (CR) \$0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 40-column printer contains 20. Double width characters are 12 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code \$17 to code \$1F.



## **ASCII: - Hex: \$02**

### **Double height printing**

The command \$02 is used to activate double height printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command \$02 after a (CR) \$0D so that the string is printed first and, on clearing the buffer, double width printing is enabled. When this printing mode is set, the number of characters per line remains 24 for the 24-column printer and 40 for the 40-column printer. Double height characters are 6 dots wide and 20 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code \$17 to code \$1F.

## **ASCII: - Hex: \$03**

### **Expanded printing**

The command \$03 is used to activate expanded printing. This command clears the print buffer and for this reason it must not be transmitted immediately after an ASCII string, otherwise this string will be erased. It is better, therefore, to transmit the command \$03 after a (CR) \$0D so that the string is printed first and, on clearing the buffer, expanded printing is enabled. When this printing mode is set, the number of characters per line is exactly halved in comparison with small characters; a printed line of a 24-column printer, therefore, contains 12 characters, and a 40-column printer contains 20. Expanded characters are 12 dots wide and 20 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code \$17 to code \$1F.

## **ASCII: - Hex: \$04**

### **Restores normal printing**

The command \$04 is used for reverting to printing in small characters (it is identical to \$00 and is used when it is impossible to use the latter). If, for example, double height or double width printing had been set and the user wishes to return to printing in small characters, he/she transmits the code \$04. This command clears the print buffer. For this reason this command must not be transmitted after an ASCII string, otherwise the string will be erased. It is better, therefore, to transmit the command \$04 after a (CR) \$0D so that the string is printed first and, on clearing the buffer, small character printing is restored. A small character is 6 dots wide and 10 dots tall. The ASCII characters which can be printed, as may be seen from the self-test, start from code \$17 to code \$1F.

## **ASCII : - Hex: \$0A**

### **Forward feeds one line**

The command \$0A forward feeds the printer by one line. If there are any characters in the line buffer, the buffer itself is automatically printed. A line feed is equivalent to 10 dots of normal printing, the paper moves faster than it would when printing due to the automatic activation of a magnet which speeds up the paper feed.

**ASCII : - Hex: (n) \$0B**

**Forward feeds (n) lines**

The command \$0B forward feeds the printer by the number of lines previously set. This must be an ASCII number from 0-9; obviously if the number is zero, nothing will happen. Take care because the code \$0B erases the line buffer and so, if there are any characters in it, they will automatically be erased. If, for example, you want the paper to forward feed by 5 lines, transmit:

**\$35 \$0B (or, alternatively, 5 and the command \$0B).**

**ASCII: - Hex: \$0D**

**Prints line buffer**

The command \$0D (carriage return) prints the line buffer. If the buffer is empty, nothing happens. If the CRLF option is set, the code \$0D is ignored and printing only takes place if the command \$0A is transmitted. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer or through the programme from the PC.

**ASCII: - Hex: \$0F**

**Sets CRLF mode**

The command \$0F enables the CRLF option. It inhibits the action of the command \$0D, and keeping only the command \$0A as a print command. This function can be useful in cases where the RETURN key is associated with the \$0D and \$0A commands, thus causing the DP 24 - 40 to print in double spacing. To disable this option, the printer has to be reset, either by switching it off or by transmitting the reset command. When the printer is switched on, the default value of the CRLF option is contained in the flag of a byte called "option register" which can be manipulated through the configuration by using the two keys on the front panel of the printer or through the programme from the PC.

**ASCII: - Hex:\$11**

**Graphic mode**

The command \$11 enables the DP 24 - 40 printer graphic mode, i.e. to print in graphic mode transmit the command \$11 at the beginning of each line. One line for the DP 24 - 40 printer (24 column model) corresponds to 144 horizontal points divided in 24 6-point blocks. For the DP 24 - 40 printer (40 column model) one line corresponds to 240 horizontal points divided into 40 6-point blocks. For byte format in graphic configuration, see paragraph 3.2 (Graphics).

**ASCII: - Hex: \$12**

**Prints the time and date**

This command prints the time and date in the following format:

**hh : mmdd - mm - yy**

If the expanded or double width formats are selected (i.e. with less than 15 characters per line), only the time will be printed. If seconds printing is enabled, the format will be:

**hh : mm : ss dd - mm - yy**

In any event this command resets the line.

## ASCII: - Hex \$13

### Sets the time and date in serial

The command \$13 sets the time and date of the clock installed inside the DP 24 - 40. There are two ways of setting it: the first uses the 24-hour clock and the second the 12 hour a.m., p.m. clock. In the first case the 10 ASCII characters corresponding to the time and date have to be transmitted, followed by the command \$13. If, for example, we wish to enter 12.45 of 19.01.93, we have to send the following sequence:

**1, 2, 4, 5, 1, 9, 0, 1, 9, 3, \$13**

i.e.

**\$31, \$32, \$34, \$35, \$31, \$39, \$30, \$31, \$39, \$33, \$13**

In the second case the 10 ASCII characters corresponding to the time and date preceded by "A" or "P", to indicate ante- or post-meridian, are sent to the printer followed by the command \$13. If, for example, we wish to enter A12.45 of 19.01.93, we have to send the following sequence:

**A, 1, 2, 4, 5, 1, 9, 0, 1, 9, 3, \$13**

i.e.

**\$41, \$31, \$32, \$34, \$35, \$31, \$39, \$30, \$31, \$39, \$33, \$13**

It is advisable to send the command \$00 first (normal printing mode) in order to erase the print buffer so as to ensure that there were no old characters still in it.

## ASCII: - Hex: \$14

### Transmits the time and date in serial

The command \$14 transmits the contents of the Real Time Clock to the printer's serial port in the format of 11 ASCII characters:

**hour / minutes / day / month / year + CR \$0D**

If the seconds option is enabled, the seconds will be transmitted after the minutes. This command can only be used if the serial port is being used; if the parallel port is being used, the printer will not be able to print anything.

## ASCII: - Hex: \$17, \$18, \$19, \$1A, \$1C, \$1D, \$1E, \$1F

### Prints the 1st (...8th) programmable character

If the hexadecimal character \$17 (...\$1F) is transmitted to the DP24 printer, it will print the corresponding programmable character. In fact, it is possible to programme eight characters which can be printed at any time with the codes from \$17 to \$1F. There are two ways of programming the characters; the can be saved in a non volatile memory which stores all the data, even when the printer is switched off, or alternatively, in a memory which is automatically erased when the power is switched off. In the first case, the user can ask the technicians responsible to programme the eight characters, depending on his requirements, or the user himself can programme them by using the personalized software supplied by Custom Engineering. In the second case, the user can form the characters at the same time as he is transmitting the text to be printed; the advantage of this approach is that an infinite number of symbols can be associated to a character, exactly as the user pleases, which he can print and modify as he sees fit. If the printer is new (or if the characters have not been manipulated), the following symbol ||| will be associated with codes \$17, ..., \$1F; each time the printer is switched on, the above mentioned codes will contain the last characters programmed in the non volatile memory.

**ASCII: ESC R Hex: \$1B \$52**

**Sets the printer in reverse mode**

The command “ESC” R selects reverse mode printing. In reverse mode printing, the ticket comes out of the printer with the writing right side up and running from left to right. When the printer is switched on, the default value is selected by the flag of a location called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

**ASCII: ESC N Hex: \$1B \$4E**

**Sets the printer in normal mode**

The command “ESC” N selects normal mode printing. In normal mode printing, the ticket comes out of the printer with the writing upside down and running from right to left. When the printer is switched on, the default value is selected by the flag of a location called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer with which the default value can be changed and it can be decided whether the printer is to be in reverse or normal mode when it is switched on.

**ASCII: ESC @ Hex: \$1B \$40**

**Resets the printer**

The command “ESC” @ resets the printer software. This command is identical to the hardware reset command and can be used for re-initializing the printer’s parameters. Obviously, after this command the receiving buffer is zero-set and all the data transmitted to the printer is lost. Once the command has been transmitted, approximately 1.5 seconds pass before the printer becomes active again. The reset command can be useful when the system is switched on in order to avoid false characters, which would corrupt the printer’s receiving buffer, from being sent during the master device’s initializing phases.

**ASCII: ESC C Hex: \$1B \$43**

**Makes the complete cut**

The cutter must be installed: if it is enabled, this command prompts the complete cut of paper. The FEED motor is stopped to ensure that the paper does not jam during cutting.

**ASCII: ESC P Hex: \$1B \$50**

**Makes the partial cut**

The cutter must be installed: if it is enabled, this command prompts partial cutting of the paper, i.e. the receipt remains loosely attached. The FEED motor is stopped to ensure that the paper does not jam during cutting.

### **ASCII: ESC D Hex: \$1B \$44**

#### **Enters the date in the buffer**

The command "ESC" D is used for entering the date of the Real Time Clock fitted inside the printer in the line buffer. The format of the date is dd-mm-yy. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

**DATA : 11-09-93 TEST OK**

you will send:

**DATA : \$1B\$44 TEST OK \$0D**

If you only wish to print the date, it is enough to transmit \$1B\$44\$0D. The date is transmitted in 8 characters and, if there is not sufficient space left in the line buffer, it is not printed.

### **ASCII: ESC T Hex: \$1B \$54**

#### **Enters the time in the line buffer**

The command "ESC" T is used for entering the time of the Real Time Clock fitted inside the printer in the line buffer. The format of the time is hh-mm. This command can be used for entering the time in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

**TIME : 16.45 TEST OK**

you will send:

**TIME : \$1B\$54 TEST OK \$0D**

If you only wish to print the time, it is enough to transmit \$1B\$54\$0D. The time is transmitted in 5 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

### **ASCII: ESC U Hex: \$1B \$55**

#### **Enters the date (mm-dd-yy) in the buffer**

The command "ESC" U is used for entering the date, American style mm-dd-yy, of the Real Time Clock fitted inside the printer in the line buffer. This command can be used for entering the date in the context of a sentence without zero-setting the line buffer. If, for example, you wish to write:

**DATE : 09-11-93 TEST OK**

you will send:

**DATE : \$1B\$55 TEST OK \$0D**

If you only wish to print the date, it is enough to transmit \$1B\$55\$0D. The date is transmitted in 8 characters and, if the seconds option is enabled in 8 characters; if there is not sufficient space left in the line buffer, it is not printed.

**ASCII: ESC S Hex: \$1B \$53**

**Enables the printing of seconds**

The command “ESC” S enables the printing of seconds when the time is requested with command “ESC” T. When the printer is switched on the default value, which determines whether or not the seconds are to be printed, is contained in the flag of a byte called the “option register”; this flag can be manipulated by programming, using the two keys on the front panel of the printer.

**ASCII: ESC O Hex: \$1B \$4F**

**Transmits operating hours in serial**

The command “ESC” O (option of software release 5.3) transmits the total operating hours of the printer to the serial port. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect. In addition, if the user utilizes the parallel port, the operating hours will not be transmitted since the parallel port is unidirectional. The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours. The transmission format is in ASCII standard and four characters are transmitted: in order of importance. The transmission protocol is the same as that set by the user on the serial interface. As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting.

**ASCII: ESC T Hex: \$1B \$48**

**Zero-sets total operating hours**

The command “ESC” T zero-sets the printer’s total operating hours. If you are using the total hours option, it is advisable to use this command immediately after switching on the printer so as to synchronize the operating hours of the printer itself with those of the master device.

**ASCII: ESC o Hex: \$1B \$6F**

**Prints total operating hours**

The command “ESC” o enters the total operating hours in the line buffer. These hours are allocated in the battery-driven RAM of the Real Time device fitted inside the printer. If, therefore, there is no Real Time Clock, this command will produce no effect. The hours begin to increase as soon as the printer is switched on. The increase is, in actual fact, on a minute to minute basis but the printer only counts the completed hours. As there are four characters it can reach a maximum of 9999 operating hours; it then automatically zero-sets and continues counting. If, for example, you wish to write:

**TOTAL HOURS: 0123 TEST OK**

you will send:

**TOTAL HOURS: \$1B\$6F TEST OK**

The hours are printed in four characters and if there is not enough space in the line buffer, they will not be printed.

**ASCII: ESC B Hex: \$1B\$42**

**Sets character font 1**

The command “ESC” B selects the first character font. The complete font is printed during the self-test. Some codes are not standard and are as follows:

**\$60, \$7B, \$7C, \$7D, \$7E, \$7F, \$8D, \$ED, \$FA and \$FF.**

These characters are compatible with earlier printer models. The font may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer, by means of which the default values can be changed.

**ASCII: ESC b Hex: \$1B \$62**

**Sets character font 2**

The command “ESC” b selects the second character font. The complete font is printed during the self-test. This font contains Cyrillic characters. It may be selected at any time, keeping in mind that the printer cannot print a line containing two different fonts and will print, therefore, the last font selected. When the printer is switched on the default value, which establishes which printing font is to be used, is selected by a flag in a location called the “option register”; this flag can be manipulated by programming, using the the two keys on the front panel of the printer, by means of which the default values can be changed.

**ASCII: (aa) ESC r Hex: (aa) \$1B \$72**

**Reads a piece of data at an address**

The command “ESC” r makes it possible to read in a location of the non volatile memory (EEPROM). This command can only be used with the serial port as it is bi-directional. The communication protocol is defined by the dip-switches on the serial interface. There are 256 legible locations, starting from the \$00 location up to the \$FF location. The address of the location to be read must be defined before the “ESC” r command is transmitted, i.e. if we wish to read address \$01, we have to transmit in ASCII:

**0 1 “ESC” r or \$30 \$31 \$1B \$72**

In reply to this reading, the printer transmits the data of address \$01. The reply also is given in ASCII; thus if, for example, address \$01 contains \$A5, we will receive:

**A 5 or \$ 41 \$35**

The entire memory bank contains the value \$20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.



**ASCII: (aadd) ESC w    Hex: (aadd) \$1B \$77**

**Writes a piece of data (dd) in an address (aa)**

The command "ESC" w makes it possible to save a piece of data in a non volatile memory. There are 256 locations in which to write, starting from \$00 to \$FF. The pieces of data too cannot exceed \$FF (255) and both the addresses and the data must be expressed in ASCII on two bytes. To save a piece of data, first transmit the address, then the data followed by the command "ESC" w. If, for example, you wish to save the data \$A5 in address \$01, you will transmit:

**0 1 A 5 "ESC" w    or \$30 \$31 \$41 \$35 \$1B \$77**

The entire memory bank contains the value \$20 by default. Since it is a non volatile memory, the user can save the data without losing it when the power is switched off.

**ASCII: (dd) ESC G    Hex: (dd) \$1B \$47**

**Writes value (dd) in option register**

By means of the command "ESC" G the printer configuration can be manipulated. To do so, a byte in ASCII containing the configuration must be transmitted to the printer, followed by "ESC" G. The setting byte contains the following bits:

**d7, d6, d5, d4, d3, d2, d1, d0**

where:

**d0:** is used to enable the setting of the Real Time Clock using the keys on the front of the printer. If this bit is 0, it disables setting; if it is 1 it enables it. If the user disables this function the clock will not be affected by variations made either accidentally or deliberately by persons not qualified to do so.

**d1:** is used for setting the printing mode: normal or reverse. If this bit is 0 printing is in normal mode; if it is 1 it is in reverse mode.

**d2:** is used in parallel communication and enables the 7 or 8 data bit protocol. If this bit is 0 the parallel port accepts 8 bit data; if it is 1 the port accepts 7 bit data. If the 7-bit protocol is enabled, the printer will only be able to print non extended characters, i.e. those from code \$0E to code \$7F.

**d3:** its purpose is to enable the printing of seconds in the clock commands. If the bit is 0 the seconds will not be printed; otherwise during the printing phase of the time the seconds will be printed too.

**d4:** if the bit is 0 command \$0D is carried out; if it is 1 the printer ignores the carriage return command.

**d5:** this bit enables the printing of the first block (heading) as soon as the printer is switched on. If the bit is 0 this function is disabled; if it is 1 the function is enabled.

**d6:** selects the character fonts during printing. A logic state 0 selects font 1, while a logic state 1 selects font 2.

**d7:** from software release 5.3 on, 0 disables the lapsed time meter while 1 enables it.

Once the printer has been configured, the above described byte in ASCII is transmitted; for example byte = 00001001 corresponds to \$09, the whole string would therefore be:

**0 9 "ESC" G    or in Hex \$30 \$39 \$1B \$47**

All these bits, with the exception of bit 7, can be manipulated by programming using the front keys of the printer.



**ASCII: (dd) ESC M Hex: (dd) \$1B \$4D**

**Writes value (dd) in printing mode**

Using the command “ESC” M it is possible to manipulate the printing mode by default. To do this a byte in ASCII containing the printing mode must be transmitted followed by “ESC” M. The type of writing which can be defined is described in the following table:

<b>\$00</b>	small character printing
<b>\$01</b>	double width printing
<b>\$02</b>	double height printing
<b>\$03</b>	expanded printing

If, for example, you wish to print in double height characters, you will send:

**0 2 “ESC” M (or \$30 \$32 \$1B \$4D)**

Automatically the printing mode is changed to the one selected and is stored in the non volatile memory.

**ASCII: ESC p Hex \$1B \$70**

**Transmits the option register in serial**

The command “ESC” p transmits the “option register” byte to the serial port of the printer. Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

**0 9 (or \$30 \$39)**

this means that the configuration will be 00001001.

**ASCII: ESC M Hex \$1B \$6D**

**Transmits the printing mode in serial**

The command “ESC” m transmits the byte containing the printing mode by default to the serial port of the printer. Obviously if the printer is using the parallel protocol, the command will produce no effect. The reply to this question is made in two ASCII bytes containing the option register value. If, for example, we receive:

**0 2 (or \$30 \$32)**

this means that the printer is in double height printing mode.

**ASCII: ESC s Hex: \$1B \$73**

**Transmits next character in serial**

The command “ESC” s (\$1B \$73) sets the printer to transmit the next character it receives. If, for example, we transmit “ESC” s A, the last character, A, will not be printed but will immediately be transmitted in serial. If we use this function in memorizing blocks of text, we can simulate a password which would be transmitted, for example, when the printer is switched on, or command codes on pressing the PRINT key, or connected printer tests.

### **ASCII: ESC W (n) Hex: \$1B \$57 (n)**

#### **Starts saving block (n)**

The command "ESC" W (\$1B \$57) followed by a number (from 1 to 3) activates the function for saving a file in one of the three blocks defined by the number n. These blocks are contained in a non volatile memory which stores the data even when the power is switched off. The length of the files which can be memorized is of 300 bytes for the first block and 700 bytes for the second and third blocks. The files can contain all kinds of codes; it is therefore possible to store tests, data, executive commands to the printer, auto-headings, graphic files etc. If files exceeding the memory bank capacity are transmitted, the extra characters will be printed directly without being saved. Loading can be done in either serial or parallel. When you have finished loading a block, it is advisable to enter the terminating command "ESC" Z. The three blocks stored in this way can either be printed or transmitted in serial. If printer commands have been saved, these will be carried out as they would normally.

### **ASCII: ESC V (n) Hex: \$1B \$56 (n)**

#### **Prints block (n)**

The command "ESC" V (\$1B \$56) followed by a number (from 1 to 3) prints block n. The file continues printing until it reaches the terminating command "ESC" Z. Obviously, if the block is clear, or if all the characters are \$20, the printer will not print anything. The first block, also called heading, will automatically be printed when the printer is switched on, if the auto-heading flag is set. The user's logo or the name of his company can, therefore, be printed each time the printer is switched on. The three blocks can also be printed one after the other, there being a total memory bank of 1700 bytes. To recall a block, you must enter the command "ESC" V and the number of the block you wish to recall.

### **ASCII: ESC E (n) Hex: \$1B \$45 (n)**

#### **Transmits block (n) in serial**

The command "ESC" E (\$1B \$45) followed by a number (from 1 to 3), transmits in serial the memory block defined by n. If the printer is using the parallel port this command will, of course, produce no effect. The file will be transmitted in its entirety, the first block will contain 300 bytes and the second and third blocks 700 bytes each.

### **ASCII: ESC Z Hex: \$1B \$5A**

#### **Block saving completed**

The command "ESC" Z (\$1B \$5A) acts as a terminator for the three memory blocks. When the line buffer reads this terminating command during printing, it stops printing the block and reverts to normal functioning. In the absence of the terminating command, the entire block will be printed.

## ASCII: ESC J (n) Hex: \$1B \$4A (n)

### Loads programmable character (n)

The command "ESC" J (\$1B \$4A) followed by a number (1 or 2 for 4.3 software and 1 - 8 for 5.3 software) is used to generate the programmable characters. The programmable characters go from code \$1E to code \$1F (4.3) or from code \$17 to code \$1F (5.3). A programmable character consists of 10 lines of 6 dots each; to form a character which corresponds to code \$1E, therefore, you must transmit 10 bytes preceded by "ESC" J1. The bytes must have the same characteristics as the graphic mode, i.e.:

<b>X</b>	<b>P7</b>	<b>P6</b>	<b>P5</b>	<b>P4</b>	<b>P3</b>	<b>P2</b>	<b>P1</b>
d7	d6	d5	d4	d3	d2	d1	d0

where:

**x** is not used;

**P7** must be fixed at 1;

**P1 to P6**: the graphic dot data ; if it is at 1 it prints and if it is at 0 it does not print.

The P6 bit of the string of points transmitted is printed on the left with the other points running from left to right (P6, P5, P4, P3, P2, P1) as illustrated:

P6	P5	P4	P3	P2	P1	<b>1<sup>st</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>2<sup>nd</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>3<sup>rd</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>4<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>5<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>6<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>7<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>8<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>9<sup>th</sup> byte</b>
P6	P5	P4	P3	P2	P1	<b>10<sup>th</sup> byte</b>

After the tenth byte the function "ESC" J finishes. If, for example, we wish the symbol of code \$1F to be #, we must transmit "ESC" J 2 pieces of data, i.e.:

**\$1B \$4A \$32 \$52 \$52 \$52 \$7F \$52 \$52 \$7F \$52 \$52 \$52**

All the data must be transmitted consecutively. This type of loading is allocated to the volatile memory; thus, when the power is switched off the character is zero-set and reverts, when the printer is switched on again, to the default character configured.

## 3.4. Character sets

The printer has two sets, each containing 224 characters (font 1 and font 2 figure 7), which can be called up from the programme configuration (paragraph 2.3) or through the control characters (paragraph 3.3).

Figure 7

### FONT 1

23456789ABCDEF

```
0 00P0p0e0a0 0000
1 !1A0a0u0a0 0000
2 "2BRbr0r0 0000
3 #3CScs00u 0000
4 $4DTdt00n 0000
5 %5EUeu00N 0000
6 &6FVfv00e 0000
7 ^7GWsw00e 0000
8 (8HXhx00y 0000
9 )9IViv00o 0000
A *JZJz00u 0000
B +;KI k0i0k0 0000
C ,<L\l0i0l0 0000
D -=MIm0i0i0 0000
E .>N^n000e0 0000
F /?O_o0#0f0 0000
```

### FONT 2

23456789ABCDEF

```
0 00P'zAPa0 0000
1 !1AQa1BC0 0000
2 "2BRbrBT0 0000
3 #3CScs0Yr 0000
4 $4DTdt00x 0000
5 %5EUeuEXe 0000
6 &6FVfv00x 0000
7 ^7GWsw00s 0000
8 (8HXhx00m 0000
9 )9IViv00a 0000
A *JZJzKbk 0000
B +;KI k0l0l0 0000
C ,<L\l0m0m 0000
D -=MIm0H0H 0000
E .>N^n000o 0000
F /?O_o0P0P 0000
```

## A. TECHNICAL CHARACTERISTICS

### A.1 Technical specifications

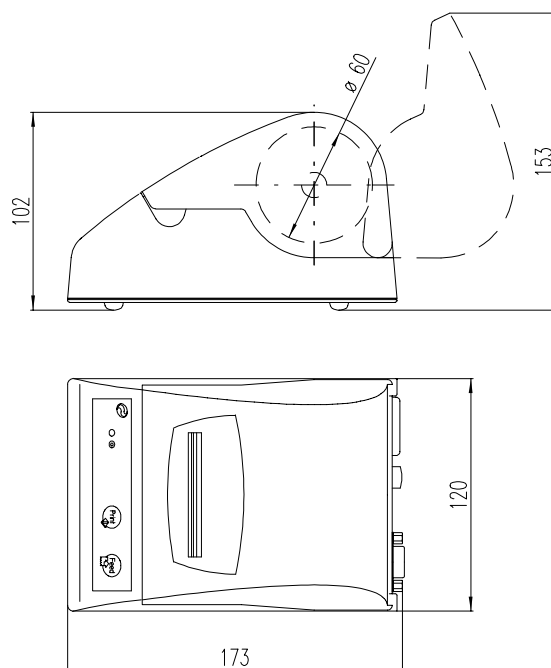
Table 2 lists the main technical features of the two printer models: DP24 (24 columns) and DP40 (40 columns).

Columns	24	40
<b>Character (L x H mm)</b>		
Normal	1,7 x 2,6	1,1 x 2,6
Double height	1,7 x 5,2	1,1 x 5,2
Double Width	3,4 x 2,6	2,2 x 2,6
Expanded	3,4 x 5,2	2,2 x 5,2
<b>Graphic point (L x H mm)</b>	0,33 x 0,38	0,19 x 0,38
<b>Points for line</b>	144	240
<b>Printing speed</b>		
Line/sec	2,5	1,5
Characters/sec	60	60
Feed (lines/sec)	6	3,6
<b>Line buffer</b>	24 bytes	40 bytes
<b>Printing buffer</b>	150 byte	
<b>Printing method</b>	Impact or dot matrix	
<b>Character matrix</b>	6 x 10 points	
<b>Printing mode</b>	Normal or reverse	
<b>Character set</b>	Normal and extended	
<b>Paper roll dimension</b>	57,5 ± 0,5mm x Ø60 max	
<b>Standard interfaces</b>	RS232 serial Centronics parallel	
<b>Power supply</b>		
Voltage	220 ± 15%	
Frequency	50/60 Hz	
<b>Absorption</b>	0.2A	
<b>Environmentals conditions</b>		
Operating temperature	0°C - +50°C	
Operating humidity	35% - 85%	
Storage temperature /humidity	-20°C - +70°C / 10%-90%	
<b>Options</b>	Real time Clock, 2 Kbyte EEPROM, autocutter	

## A. TECHNICAL CHARACTERISTICS

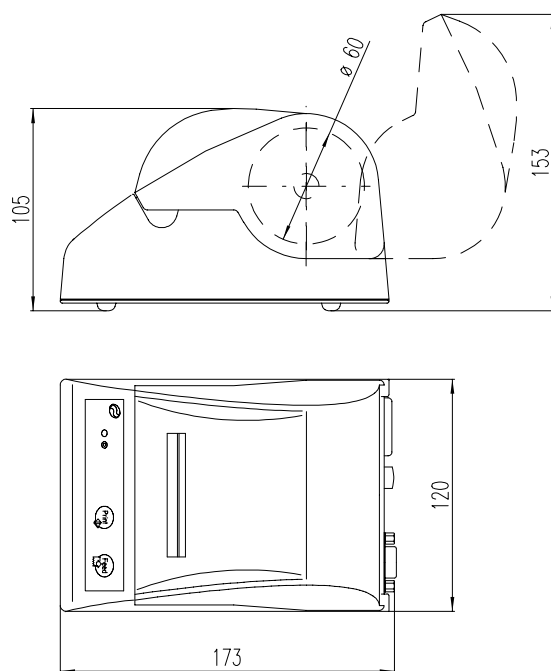
### A.2 Overall dimesions DP24-40

Figure 8



### A.3 Overall dimesions DP24-40 with autocutter

Figure 9

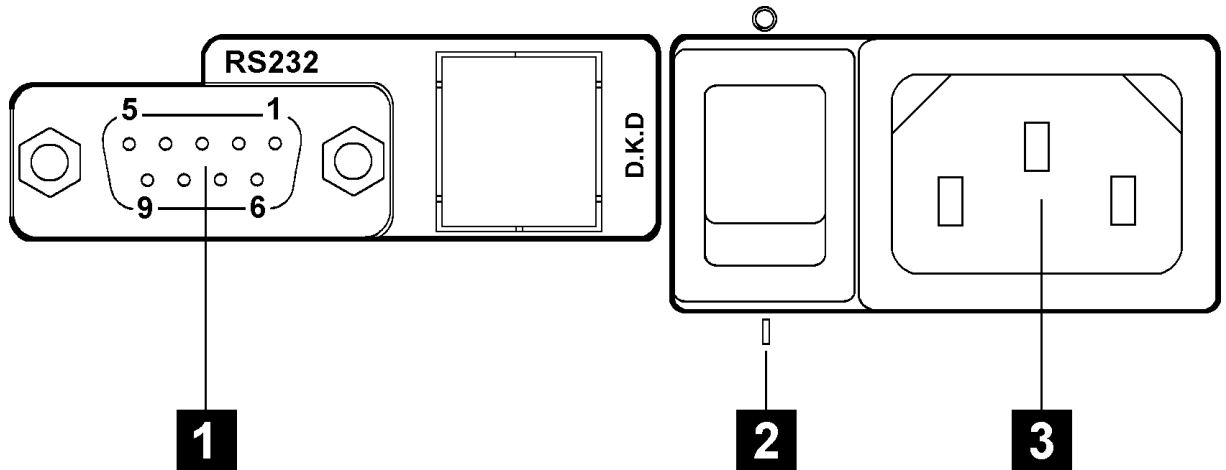


## B. CONNECTORS

### B.1 DP24-40 printer Serial RS232

The following figure shows the connector area of the DP24-40 printer equipped with RS232 serial interface.

Figure 10



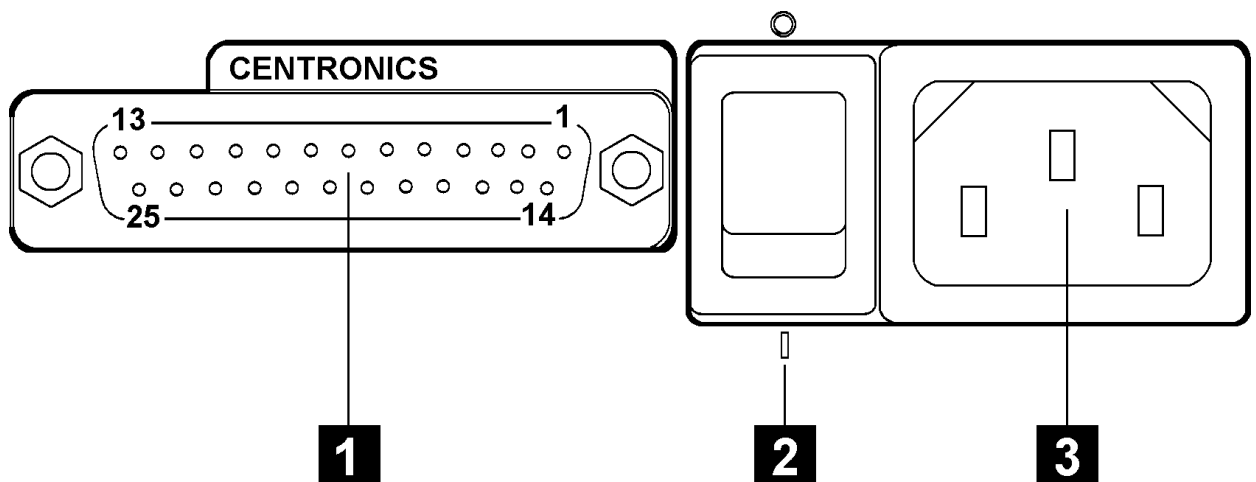
#### Legend

- 1: 9-pin standard interface connector. For the meaning of the pins, please refer to attachment C.1;
- 2: ON/OFF switch;
- 3: 3-pin standard mains socket.

### B.2 DP24-40 printer Centronics

The following figure shows the connector area of the DP24-40 printer equipped with Centronics interface.

Figure 11



#### Legend

- 1: 25-pin standard interface connector. For the meaning of the pins, please refer to attachment C.2;
- 2: ON/OFF switch;
- 3: 3-pin standard mains socket.

## C.1 RS232 serial

The printer has an RS232 serial interface and current loop. It is connected by means of a rectangular female 9-pin connector. The signals on the connector pins are shown in table 3.

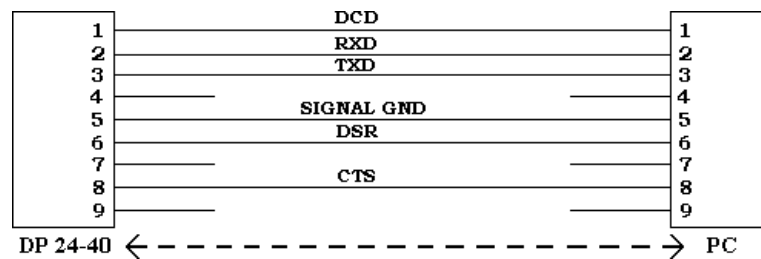
The pins which are not indicated are not connected.

**Table 3**

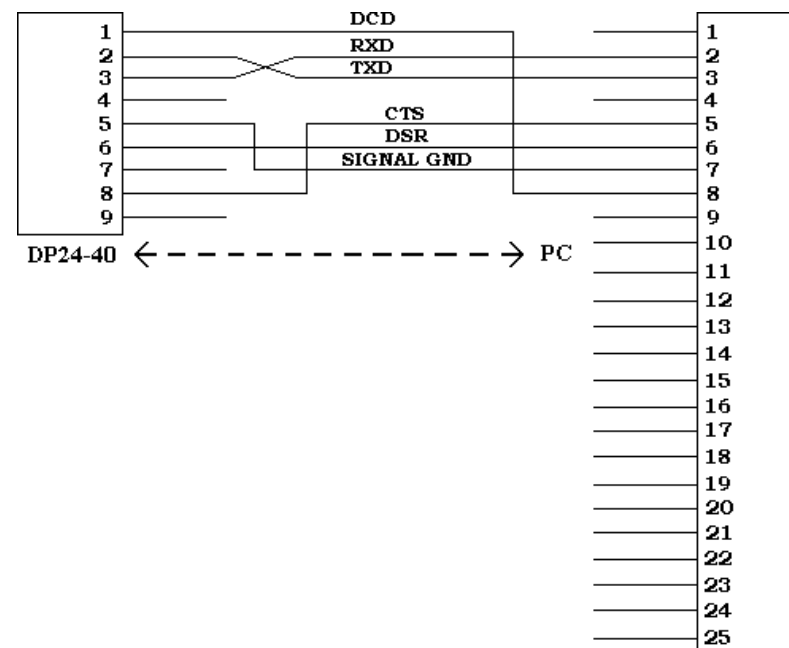
Pin	Signal	Direction	To	Description
1	DCD	OUT	DCD	Data Carrier Detect. Printer On (active at level RS232 high)
2	TXD	OUT	RXD	Receive Data. Serial output (from Host)
3	RXD	IN	TXD	Transmit Data. Serial data input (towards Host)
4	-	-	-	Not connected
5	GND	-	GND	Signal ground
6	DSR	OUT	DSR	Data Set Ready. Printer on and operating. (active at RS232 level high).
7	-	-	-	Not connected
8	RTS	OUT	CTS	Clear to Send. Ready to receive data (active at RS232 level high)
9	+12V	OUT	-	Optional. Output + 12 V 200 mA (connected on request)

The following diagrams illustrate some connection examples between printer and Personal Computer, with 9 and 25-pin connector respectively.

**Figure 12**



**Figure 13**





## C.2 Centronics parallel

The printer can be equipped with a CENTRONICS parallel interface. The connection is made with a rectangular female 25-pin connector. The signal layout is exactly the same as that used by personal computers which use the same connector, as shown in Table 4. The pins which are not indicated are not connected.

**Table 4**

Pin	Signal	Direction	Description:
1	STROBE	IN	A low level impulse on this line indicates that there is data ready to be read by the printer
2	DATA 1	IN	Data transmitted to the printer: the low level indicates binary digit 1
3	DATA 2	IN	
4	DATA 3	IN	
5	DATA 4	IN	
6	DATA 5	IN	
7	DATA 6	IN	
8	DATA 7	IN	
9	DATA 8	IN	
10	ACK	OUT	a low level impulse indicates that the printer is ready to receive further data
11	BUSY	OUT	High level active signal: indicates that the printer cannot receive data
12	PE	OUT	Paper out (always to GND)
13	SELECT	OUT	Connection to Vcc with 4.7 ohm resistance
14	-	-	Not connected
15	SELECT	OUT	Connection to Vcc with 4.7 ohm resistance
16	RESET	IN	-
17	GND	-	Pins connected to GND
18	-	-	Not connected
19	GND	-	Pins connected to GND
20	GND	-	
21	GND	-	
22	GND	-	
23	GND	-	
24	GND	-	
25	GND	-	

# INTERFACES

The following diagrams illustrate some connection examples between printer and Personal Computer, with 25 and 36-pin (Ribbon) connector respectively.  
The connections marked with an (\*) are not essential for the functioning of the interface.

Figure 14

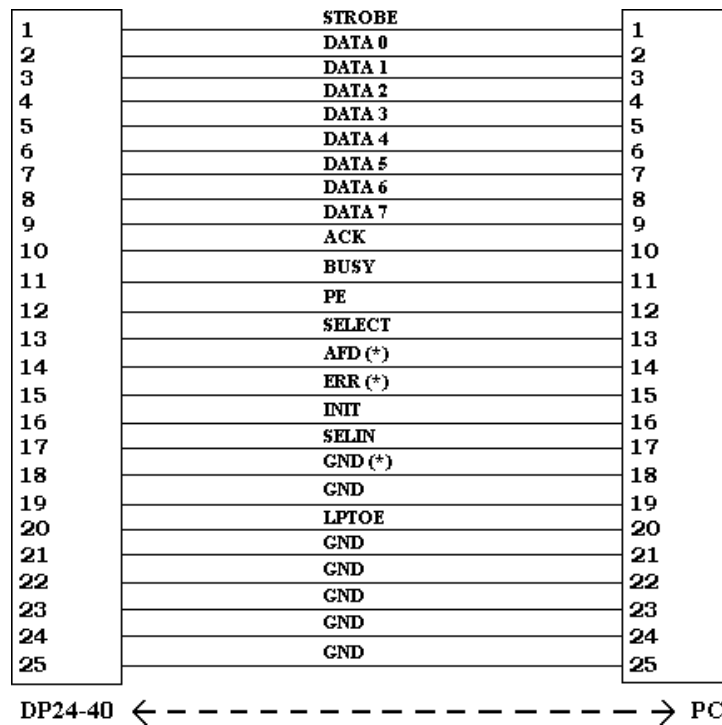
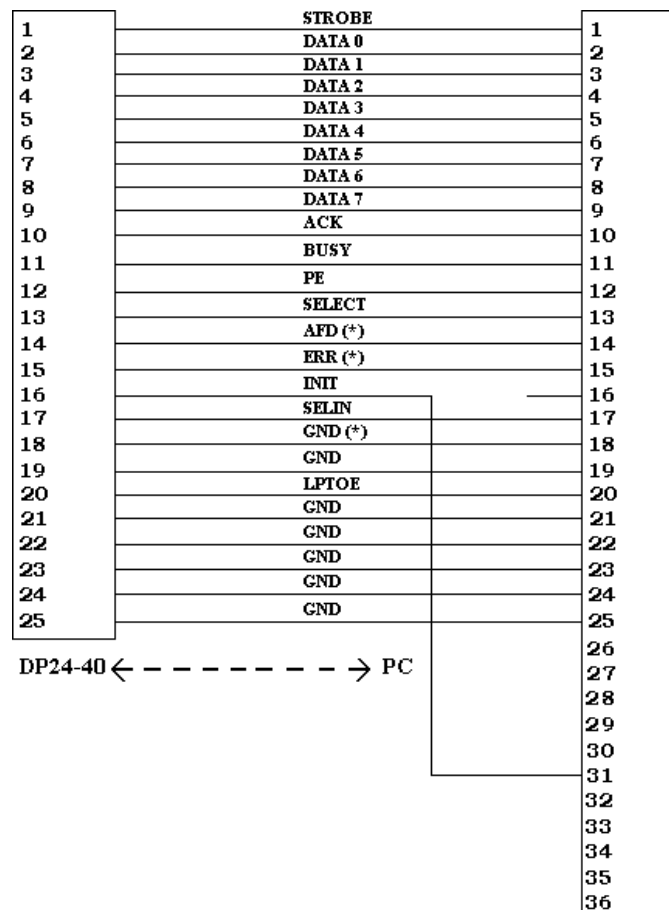


Figure 15



## C.3 Real Time Clock (option)

The Real Time Clock is available as an option. Printing and adjustment of the clock are managed by a series of control characters:

<b>\$12</b>	Prints clock
<b>\$13</b>	Sets clock
<b>\$14</b>	RTCK transmission in serial
<b>ESC T</b>	Enters the time in the print buffer
<b>ESC D</b>	Enters the date in the print buffer
<b>ESC U</b>	Enters the date (American-style) in the print buffer

### How to adjust the clock using the keyboard

The time and date can be adjusted by using the PRINT and FEED keys on the front panel of the printer. Setting procedure is as follows:

1. hold down the FEED key and simultaneously press the PRINT key.  
The printer will print the time and date with an arrow indicating a digit to be changed;
2. each time the PRINT key is pressed, the digit indicated by the arrow will increase and the updated version will be printed;
3. to select the next digit which requires adjusting press the FEED key again. On completion of each operation, the printer will print the updated time and date, highlighting by means of an arrow the digit currently being selected;
4. to terminate setting, press PRINT and FEED at the same time, or run through all the parameters.

### Lapsed time meter

By means of this function (option available with software release 5.3) implemented in the Real Time Clock, the total operating hours of the printer can be memorized. It is managed by three control characters (only if the RTCK is available):

<b>ESC O</b>	Transmits in serial total operating hours.
<b>ESC o</b>	Inserts total operating hours in the line buffer, thus enabling this to be printed in any string.
<b>ESC M</b>	Zero-sets total operating hours.

For more information on the control characters which manage the clock, see paragraph 3.3.